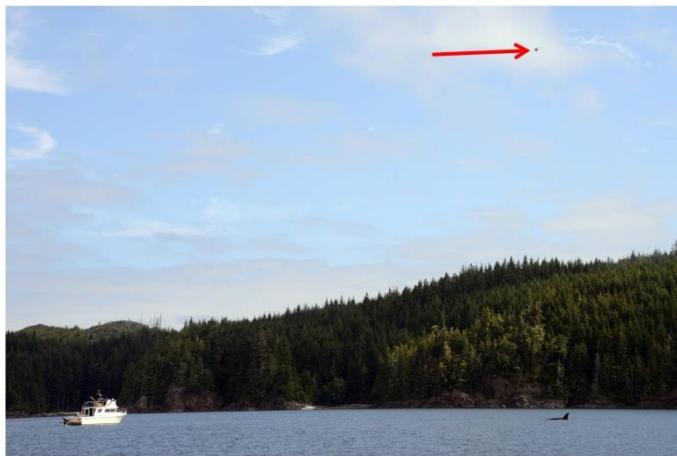


Assessing growth and body condition of killer whales to infer nutritional status

Scientists from the NOAA Southwest Fisheries Science (John Durban, Wayne Perryman, Holly Fearnbach) have completed a collaborative field study to "*Assess growth trends and body condition of killer whales to infer nutritional status*". This study focussed on the Northern Resident population of killer whales (*Orcinus orca*) off Northern Vancouver Island, Canada, and was a collaborative study with the Vancouver Aquarium Marine Science Center (Lance Barrett-Lennard) and Aerial Imaging Solutions (Don LeRoi). The study aimed to estimate lengths of whales using boat-based laser photogrammetry and widths will be measured from vertical photographs that were collected using an unmanned aerial system (hexacopter). These metrics will be used to infer growth trends and current body condition, respectively, which will be related to trends in returning Chinook salmon (the whales' primary prey) in past decades. Notably, inference about growth and condition will be compared to [similar assessments for the endangered Southern Resident killer whale population](#) that aggregates in adjacent U.S. and Canadian boundary waters off Southern Vancouver Island. The aim is to provide a comparative assessment of nutritional status to guide management of these two protected populations.



Boat-based operations using the APH-22 marine hexacopter, which was hand-deployed and retrieved (top left and right) and used to obtain overhead images of whales at distances up to 500ft from the vessel at altitudes >100ft (bottom left). Arrow indicates hexacopter hovering above a killer whale. Research approach authorized under a license to study marine mammals issued by Fisheries and Oceans Canada (2014-06 SARA-327).

The new marine version of the APH-22 hexacopter incorporates a series of modifications specifically targeted to meet the challenges of sampling at sea from small moving platforms. It performed flawlessly during this field effort and the high resolution aerial images we collected allowed us to identify individual whales from the air and will allow determination their body condition based on measurements of size and shape (pending image analysis). Sixty flight missions were successfully completed (representing 13.25 hours of combined flight time), resulting in overhead images of 77 different Northern Resident killer whales; boat-based laser-metric images were also collected from most of these whales. Together, photogrammetric measurements from these images will be used to assess long-term growth trends and current body condition, which will be compared to similar metrics from endangered southern resident killer whales.



Aerial image above of members of the I15 matriline of Northern Resident killer whales showing variance in body lengths for whales of different ages. Research approach authorized under a license to study marine mammals issued by Fisheries and Oceans Canada (2014-06 SARA-327).